POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent, U. S. Naval Observatory. Data furnished by the U. S. Naval Observatory in cooperation with Harvard and Mount Wilson Observatories. The difference in longitude is measured from the central meridian, positive west. The north latitude is positive. Areas are corrected for foreshortening and are expressed in millionths of the sun's visible hemisphere. The total area for each day includes spots and groups]

Date	Eastern standard time	Mt. Wilson group number	Heliographic			Area		Total area for each day	Observatory
			Diff. in longitude	Longitude	Latitude	Spot	Group		
1937	*h. m.*		°	°	°				
Dec. 1	11 25	5664	−36.0	98.0	−10.0		24	24	U. S. Naval.
Dec. 2	11 52	5670	−70.0	50.6	−20.0	48			Do.
		5669	−49.5	71.1	−18.5	48			
		5664	−22.0	98.6	−10.0	6			
		5663	−15.0	105.6	+10.0		12		
		5668	−12.0	108.6	−13.0		36		
		5667	+53.0	173.6	+29.5		24	174	
Dec. 3	11 5	5671	−70.0	37.9	+12.0	12			Do.
		5670	−58.0	49.9	−19.0	61			
		5664	−10.0	97.9	−9.5		12	85	
Dec. 4	11 32	5671	−57.0	37.4	+13.0	12			Mt. Wilson.
		5670	−48.0	46.4	−19.0		61		
		5664	+3.0	97.4	−9.0		12	85	
Dec. 5	11 12	5676	−79.0	2.4	+22.0	48			Do.
		5675	−53.5	27.9	+8.0	16			
		5670	−35.5	45.9	−19.0		61		
		5674	+18.0	99.4	−17.0		73		
		5673	+66.0	147.4	−23.0		36	234	
Dec. 6	11 11	5676	−66.0	2.3	+23.0	61			Do.
		5670	−18.0	50.3	−18.0	36			
		5678	−13.0	55.3	−26.0		85		
		5677	+1.0	69.3	−18.5		24		
		5672	+31.0	99.3	+12.0		24		
		5674	+32.0	100.3	−17.0		242		
		5673	+80.0	148.3	−25.0	24		496	
Dec. 7	11 7	5676	−52.0	3.1	+22.0		36		U. S. Naval.
		5670	−5.0	50.1	−19.0	16			
		5678	+1.0	56.1	−25.5		36		
		5677	+16.0	71.1	−19.0		36		
		5674	+45.0	100.1	−18.0		291		
		5672	+45.0	100.1	+11.0		24	439	
Dec. 8	11 9	5676	−40.0	1.9	+21.5	16			Do.
		5670	+9.0	50.9	−19.0	16			
		5678	+13.0	54.9	−25.0	12			
		5679	+30.5	72.4	−19.0	24			
		5674	+59.0	100.9	−18.5		194		
		5672	+59.0	100.9	+11.0		48	310	
Dec. 9	11 17	5682	−74.0	314.7	+8.0	73			Do.
		5683	−74.0	314.7	−22.0		145		
		5676	−27.0	1.7	+22.0	36			
		5670	+22.0	50.7	−18.0	16			
		5679	+44.0	72.7	−18.0	16			
		5672	+72.0	100.7	+11.0		97		
		5674	+72.0	100.7	−18.0		194	577	
Dec. 10	10 58	5683	−62.0	313.7	−22.0		485		Do.
		5682	−59.0	316.7	+8.0		97		
		5676	−13.0	2.7	+22.0	24		606	
Dec. 11	11 2	5683	−50.0	312.5	−21.0		970		Do.
		5682	−44.0	318.5	+9.0		145		
		5681	−24.0	338.5	−23.0		97	1,212	
Dec. 12	13 32	5683	−35.0	312.9	−21.0		921		Do.
		5682	−29.0	318.9	+9.0		339		
		5681	−10.0	337.9	−23.0		97		
		5680	+7.0	354.9	−22.0		97	1,454	
Dec. 13	11 9	5683	−24.0	312.0	−20.0		921		Mt. Wilson.
		5682	−14.0	322.0	+10.0		485		
		5681	+4.0	340.0	−22.0		97		
		5680	+19.0	355.0	−21.0		97		
		5684	+33.0	9.0	+13.0		121	1,721	
Dec. 14	12 15	5688	−83.0	239.3	+26.0	727			U. S. Naval.
		5685	−19.0	303.3	−6.0		73		
		5683	−10.0	312.3	−20.0		824		
		5682	0.0	322.3	+9.0		533		
		5681	+18.5	340.8	−22.0	36			
		5687	+19.0	341.3	−9.5		61		
		5680	+30.0	352.3	−22.0	36			
		5686	+40.0	2.3	+23.0		85		
		5684	+47.0	9.3	+14.0		121	2,496	
Dec. 15	14 46	5688	−70.0	237.7	+27.0		1,454		Mt. Wilson.
		5692	−65.0	242.7	−23.0	48			
		5685	−3.0	304.7	−6.0		194		
		5683	+5.0	312.7	−20.0		679		
		5691	+5.0	312.7	+10.0		48		
		5690	+15.0	322.7	−9.5		36		
		5689	+30.5	338.2	+5.0		48		
		5687	+34.0	341.7	−10.0		48		
		5686	+55.0	2.7	+23.0		194		
		5684	+62.0	9.7	+14.0		48	2,797	

POSITIONS AND AREAS OF SUN SPOTS—Continued

Date	Eastern standard time	Mt. Wilson group number	Heliographic			Area		Total area for each day	Observatory
			Diff. in longitude	Longitude	Latitude	Spot	Group		
1937	*h. m.*		°	°	°				
Dec. 16	14 27	5688	−57.0	237.7	+27.0		1,115		U. S. Naval.
		5692	−55.0	239.7	−22.0		48		
		5693	−43.0	251.7	+23.0		48		
		5685	+10.0	304.7	−6.0		48		
		5691	+18.0	312.7	+9.0		61		
		5683	+19.0	313.7	−20.0		582		
		5682	+27.0	321.7	+9.0		485		
		5687	+50.0	344.7	−11.0		12		
		5686	+67.0	1.7	+23.0		194		
		5684	+70.0	4.7	+14.0	12		2,605	
Dec. 17	11 26	5688	−45.0	238.2	+27.0		1,115		Mt. Wilson.
		5692	−38.0	245.2	−20.0		24		
		5693	−30.0	253.2	+24.0		97		
		5685	+22.0	305.2	−6.0		48		
		5691	+25.5	308.7	+10.0		121		
		5683	+32.0	315.2	−20.0		533		
		5682	+39.0	322.2	+10.0		485		
		5687	+60.0	343.2	−9.0		36	2,459	
Dec. 18	10 51	5688	−33.0	237.4	+27.0		873		U. S. Naval.
		5692	−28.0	242.4	−21.0		194		
		5693	−17.0	253.4	+23.0		36		
		5685	+36.0	306.4	−7.0		36		
		5691	+43.0	313.4	+9.0		97		
		5683	+44.0	314.4	−21.0		388		
		5682	+54.0	324.4	+8.0		291	1,915	
Dec. 19	12 54	5688	−17.0	239.0	+27.0		679		Do.
		5692	−12.0	244.0	−21.5	24			
		5693	−3.0	253.0	+22.0		388		
		5691	+57.0	313.0	+9.0		97		
		5683	+58.0	314.0	−21.0		400		
		5682	+68.0	324.0	+8.0		242	1,830	
Dec. 20	11 20	5696	−69.0	174.7	−26.5	36			Do.
		5688	−5.0	238.7	+27.0		582		
		5693	+10.0	253.7	+22.0		194		
		5691	+69.0	312.7	+9.0		97		
		5683	+70.0	313.7	−21.0		339	1,248	
Dec. 21	11 6	5696	−57.0	173.7	−27.0	48			Do.
		5688	+2.0	232.7	+28.0	36			
		5688	+9.0	239.7	+27.0		582		
		5693	+23.0	253.7	+22.0		194		
		5691	+82.0	312.7	+10.0		291		
		5683	+83.0	313.7	−20.5		242	1,393	
Dec. 22	11 12	5699	−72.0	145.5	−9.0	242			Do.
		5698	−67.0	150.5	−5.0	12			
		5697	−47.0	170.5	−8.0		12		
		5696	−43.0	174.5	−27.5	48			
		5695	−40.0	177.5	+10.0		24		
		5688	+23.0	240.5	+27.0		582		
		5693	+40.0	257.5	+21.0		145	1,065	
Dec. 24	10 59	5699	−47.0	144.2	−11.0		485		Mt. Wilson.
		5702	−40.0	151.2	+10.0		97		
		5703	−40.0	151.2	+21.0		24		
		5701	−30.0	161.2	−9.5	24			
		5696	−18.0	173.2	−27.0	36			
		5695	−11.0	180.2	+9.0		242		
		5688	+51.0	242.2	+27.0		533		
		5693	+68.0	259.2	+22.0		145	1,586	
Dec. 25	11 37	5704	−73.0	104.7	+13.0	218			U. S. Naval.
		5699	−33.0	144.7	−11.0		436		
		5703	−28.0	149.7	−20.0		97		
		5702	−26.0	151.7	+10.5		97		
		5698	−25.0	152.7	−4.5		12		
		5695	+3.0	180.7	+10.0		242		
		5688	+64.0	241.7	+27.0		436		
		5693	+83.0	260.7	+21.0		48	1,586	
Dec. 26	12 23	5704	−59.0	105.1	+13.0		218		Do.
		5699	−18.0	146.1	−11.0		388		
		5703	−13.0	151.1	−20.0		291		
		5702	−12.0	152.1	+10.0		97		
		5695	+17.0	181.1	+9.5		194		
		5688	+77.0	241.1	+27.0		388	1,576	
Dec. 27	14 38	5704	−44.0	105.7	+12.0		145		Mt. Wilson.
		5706	−12.0	137.7	−9.0		16		
		5699	−4.0	145.7	−11.0		388		
		5703	+1.0	150.7	−20.0		727		
		5702	+4.0	153.7	+10.0		145		
		5695	+32.0	181.7	+9.5		291		
		5705	+55.0	204.7	−7.0		97	1,809	
Dec. 28	11 23	5704	−31.0	107.3	+12.0		145		U. S. Naval.
		5708	−30.5	107.8	+17.5	6			
		5699	+9.0	147.3	−11.0		339		
		5703	+13.0	151.3	−20.0		727		
		5702	+17.0	155.3	+10.5		97		
		5695	+44.0	182.3	+9.5		436		
		5705	+63.0	201.3	−6.0	48		1,798	

POSITIONS AND AREAS OF SUN SPOTS—Continued

Date	Eastern standard time	Mt. Wilson group number	Heliographic			Area		Total area for each day	Observatory
			Diff. in longitude	Longitude	Latitude	Spot	Group		
1937	*h. m.*		°	°	°				
Dec. 29	11 55	5712	−32.0	92.9	−16.0	-------	48	-------	Do.
		5704	−19.0	105.9	+12.5	-------	194	-------	
		5707	−9.0	115.9	+19.0	-------	24	-------	
		5711	−9.0	115.9	+14.5	-------	12	-------	
		5710	+8.0	132.9	−14.5	-------	36	-------	
		5699	+23.0	147.9	−11.0	-------	242	-------	
		5703	+26.0	150.9	−20.0	-------	582	-------	
		5702	+30.0	154.9	+10.0	-------	36	-------	
		5695	+59.0	183.9	+10.0	-------	194	1,368	
Dec. 30	12 12	5712	−19.0	92.5	−15.0	-------	97	-------	Mt. Wilson.
		5704	−6.0	105.5	+13.0	-------	194	-------	
		5707	+7.5	119.0	+19.0	-------	24	-------	
		5710	+22.0	133.5	−14.5	36	-------	-------	
		5709	+26.0	137.5	−16.0	-------	24	-------	
		5699	+36.0	147.5	−11.0	-------	242	-------	
		5703	+39.0	150.5	−21.0	-------	485	-------	
		5702	+45.0	156.5	+10.0	-------	36	-------	
		5695	+70.0	181.5	+9.0	-------	97	1,235	
Dec. 31	11 20	5713	−75.0	23.8	+5.0	-------	388	-------	U. S. Naval.
		5712	−7.0	91.8	−15.0	-------	145	-------	
		5704	+9.0	107.8	+12.5	-------	97	-------	
		5707	+20.0	118.8	+19.5	-------	73	-------	
		5710	+37.0	135.8	−14.5	24	-------	-------	
		5709	+40.0	138.8	−15.0	-------	48	-------	
		5699	+50.0	148.8	−11.0	-------	242	-------	
		5703	+53.0	151.8	−20.0	-------	339	-------	
		5702	+58.0	156.8	+11.0	24	-------	1,380	

Mean daily area for 30 days=1,252.

PROVISIONAL SUNSPOT RELATIVE NUMBERS, DECEMBER 1937

[Dependent alone on observations at Zurich and its station at Arosa]

[Furnished through the courtesy of Prof. W. Brunner, Eidgen. Stern-Warte, Zurich, Switzerland]

December 1937	Relative numbers	December 1937	Relative numbers	December 1937	Relative numbers
1	14	11	*Ec* 72	21	86
2	*Wc* 33	12	70	22	*Ecd* 90
3	-------	13	*Mc* 107	23	*Ec* 107
4	-------	14	*Macd* 112	24	-------
5	55	15	*Wac* 141	25	*a*
6	-------	16	*Ec* 155	26	-------
7	-------	17	-------	27	*aa* 125
8	-------	18	109	28	*a* 103
9	-------	19	*a* 124	29	*Mc* 113
10	56	20	*b* 107	30	*Mc* 111
				31	*ad* 112

Mean, 21 days=95.3

a=Passage of an average-sized group through the central meridian.
b=Passage of a large group or spot through the central meridian.
c=New formation of a group developing into a middle sized or large center of activity; *E*: on the eastern part of the sun's disc; *W*: on the western part; *M*: in the central circle zone.
d=Entrance of a large or average-sized center of activity on the east limb.

AEROLOGICAL OBSERVATIONS

[Aerological Division, D. M. LITTLE in Charge]

By LOYD A. STEVENS

Mean free-air data, based on airplane weather observations during December 1937, are given in tables 1 to 3. A description of the methods by which the various monthly means and normals therein are computed may be found in the aerological sections of the MONTHLY WEATHER REVIEW for January and March 1937.

It will be noted that many of the "normals" are based on only 3 years of observations. Conclusions based on departures from such short period "normals" must be used with caution.

The mean surface temperatures for December (see chart I) were, in general, above normal over the Rocky Mountain and Pacific coast regions and over portions of the North Atlantic and southern New England States; elsewhere they were below normal. The greatest positive departures (+3° C. to +4° C.) occurred over portions of the Rocky Mountains while the greatest negative departures (−1° C. to −2° C.) occurred over a region whose center was approximately over the state of Illinois.

With a few exceptions, the mean free-air temperatures for the month, up to 5 kilometers, were below normal. The most significant exception occurred over Oakland, Calif., where the temperature was above normal at all levels, the greatest positive departure from normal (+1.5° C.) occurring at 0.5 and 1 kilometer. The greatest negative departures at all levels occurred over the region of the Great Lakes (−4.3° C. at Sault Ste. Marie at 1.5 km) with a secondary center of large negative departures over Spokane, Wash. (−3.0° C. at 4 and 5 km) in the higher levels. The highest mean temperatures occurred over San Diego up to 2 kilometers and over Pensacola above 2 kilometers. The lowest mean temperatures occurred over Fargo at 0.5 kilometer and over Sault Ste. Marie at all other levels. The mean free-air temperatures for December were lower than for November by 4° C. to 8° C. over the northern part of the country. This difference in temperature between the 2 months decreased toward the south, however, and amounted to only 1° to 3° C. over the southern part of the country. The greatest decrease in the mean temperature occurred over Fargo at 0.5 kilometer where the value for December (−12.3° C.) was 9.1° C. lower than that for November (−3.2° C.).

The mean free-air relative humidities, shown in table 2, were above normal over most of the country at all levels. Minus departures were confined largely to the Northeastern States in the lower levels and to Pensacola at all except the 0.5 kilometer level. The greatest positive departure (+14 percent) occurred over San Diego at 3 kilometers while the greatest negative departure (−11 percent) occurred over Pensacola at both 3 and 5 kilometers.

The mean free-air barometric pressures are shown in table 3. In general there was a decrease in the average pressures for December as compared with those for November except that in the lower levels there were small increases of 1 to 2 millibars at most stations. The mean free-air isobaric charts, as drawn from the values in table 3, were characterized by well-defined statistical centers of low pressure over the region of the Great Lakes; the lowest mean pressures for the entire country occurring at Sault Ste. Marie, Mich., at all levels. The highest mean pressures occurred over Pensacola, Fla., at all levels. Over the eastern part of the country there was a pronounced steepening of the south to north pressure gradient in December as compared with November but a slight decrease in gradient occurred over the western part of the country.

Free-air resultant winds, based on pilot-balloon observations made near 5 a.m. (75th meridian time), are shown in table 4. In general the resultant directions were re-